SURFACE-EMITTING LASER DEVICES WITH INTEGRATED BEAM-SHAPING OPTICS AND POWER-MONITORING DETECTORS

Abstract of the Disclosure

A semiconductor surface-emitting laser device has a lasing section and a beam-deflecting section. The two sections are assembled adjacent to each other in close optical and physical proximity. The lasing section includes a horizontal laser cavity having faceted ends. The cavity emits horizontally propagating a light beam through one faceted end into the adjoining beam-deflecting section. The beam-deflecting section includes two mirror surfaces. The two mirror surfaces are oriented such that the horizontally propagating light beam is redirected to propagate vertically toward the top surface of the laser device by sequential reflections off of the two mirrors. A beam-shaping micro-optics lens is disposed on the top surface of the beam-deflecting section. The micro-optic lens collimates the vertically propagating redirected light beam to generate an output beam emitted from the top surface of the laser device.

Optionally, the laser device may have an integrated power-monitoring detector. The detector may, for example, be a photodetector built in the beam-deflecting section.